0040

BAT SURVEY

FOR

THE SUFCO MINE,

EMERY COUNTY, UTAH

SEPTEMBER, 1997

J. MARK PERKINS
&
JOSHUA R. PETERSON
2217 E. EMERSON AVENUE
SALT LAKE CITY, UTAH 84108
1-801-583-7909
EMAIL=BATSRUS1@SISNA.COM

PERKINS-SUFCO MINE BAT SURVEY (Rev. 10/98) 1

INTRODUCTION

Bats are recognized as an important component of forest management (Bruns 1960, Ross 1967, Constantine 1970, Hill and Smith 1984). They are the only predators of nocturnally active adult forms of many forest insect pests. Some recognized prey pests include, but are not limited to: Tussock moth, Spruce bud-worm moth, pine bark beetles, crane flies and mosquitoes (Thomas et al. 1976). At least two species appear to be dependent on old growth stands, and many others rely on old growth trees or large snags (dead trees) for roost sites when other structures are absent (cliffs, caves, mines, buildings) (Perkins and Cross 1988). Distribution of individual bats and bat species in forests is non-random and the overlying factor has been demonstrated to be roost limitation (Perkins 1992, Perkins and Anderson 1996). Most State and federal land management practices are species directed due to the federal and State endangered species act.

The U.S. Fish and Wildlife Service (USFWS) considered *Euderma maculatum (*Spotted Bat) and *Corynorhinus townsendii* (Townsend*s Big-eared Bat) a Category 2 species for listing as either Endangered or Threatened. Category 2 has since been deleted from the listing process and treatment of each species is usually on a National forest by National forest basis. The Utah Heritage Program (UTHP) recognizes these species as (G4S2). Most National forests in Regions 1, 4, 5, and 6 consider these species to be sensitive.

Canyon Fuel Company, LLC, in order to satisfy permit requirements for the SUFCO and Dugout Canyon Mines, initiated this survey to focus on the above two species, but we included methods that will most likely detect all bat species present.

STUDY AREA. The study area is the Link, Muddy Creek and Box Canyons. Link Canyon contains a road which parallels the creek throughout the canyon and then traverses the hill to the upper meadows above Link, Box and Muddy Creek Canyons. Sandstone formations are the predominate geologic surface formation. Within the Link Canyon, the exposed faces are weathered, resulting in scalloping, some large enough to be considered as shelter caves. Dominant plant life within the canyon are big sage (*Artemesia spp.)*, junipers *(Juniperis spp.)* and scattered maples *(Acer spp.).* Tree density is scattered and dead or defective trees are few. The water course is no perennial.

Upper Box Canyon sandstone also exhibits much erosion in the form of shelter caves. Lower Box Canyon and Muddy Creek Canyon sandstone can be characterized as "classic" cliff faces, with much vertical exposure. Within the large expanse of vertical sandstone exposure are numerous vertical cracks, typical roost habitat for *E. maculatum.*

PERKINS-SUFCO MINE BAT SURVEY (Rev. 10/98) 2

SURVEY OBJECTIVES:

- What are the bat species present in the proposed disturbance and surrounding areas?
- If bats are noted, where are the animals most likely day and night roosting?
- What habitats are they using for roosting and foraging?
- Approximately how many individuals are present for each species.
- For species not in the area, why are they absent?

Below is a brief review of habitat needs for the two species of concern as defined by literature reviews and personal field work.

Recent reviews of the Spotted Bat indicate that while found in a variety of habitats, its roosts are statistically associated with large cliff faces at least 25 m in height and at least 75 m in length, (Sarell et al. 1993). Pierson and Rainey (1997) reviewed Spotted Bat habitat associations in California and in the literature and concluded that foraging is most likely to occur in open meadows with wet seeps or wetlands, or along the edge between grassland and open forest transition. Records in Utah (Toone 1992, 1993), Oregon (Barss and Forbes 1984), (Perkins, field notes), British Columbia (Collard et al. 1991) and Colorado (Navo, *pers. comm.)* support these findings. Spotted Bat nocturnal activities most likely follow a well defined pattern (Wai-Ping and Fenton 1989, Pierson *pers. comm.*, Perkins, Field notes):

1. roosts are left at dusk,
2. bats take defined routes to foraging and drinking areas (routes may be direct or circuitous)
3. bats tend to forage most of the night in well defined areas, and
4. return to roosts only when lactating or at dawn.

Spotted Bat calls are audible and can be distinguished from other audible bats by the audible call pattern, length of call intervals and with detector equipment by sonogram printouts.

Townsend*s Big-eared Bat is primarily a cave or mine dweller (Perkins and Levesque 1987) who*s hibernacula are significantly associated with mines and caves that have multiple entries, a discernible air movement, average about 2 deg C, and provide dry walls for roosting (Perkins 1994). Summer roosts for females are characterized by warmth (Pierson 1988), air movement (Perkins and Levesque 1987) and the bats roost in entrance areas where entering potential predators are back lit. Summer roosts for males vary from attics, mines and caves to very shallow shelter caves and cliff overhangs. The single defining criteria was shelter from direct sunlight and a definable twilight zone (Perkins and Levesque 1987). Nocturnal activity generally follows the pattern presented here:

1. Roost left at dusk.
2. Flight is generally direct to foraging and drinking areas; moths comprise almost 100% of the diet.

3. Females return to day roosts frequently during the night to nurse juveniles.
4. Non- lactating females and males tend to night roost from about 3 hr. post sunset to 2 hr. prior to sunrise.

Determining species by use of bat detector is difficult, particularly if there are other species present whose calls over lap those of *C. townsendii*. In addition, *C. townsendi***s* calls are not loud and the bat generally has to be < 10m from the detector to be recorded.

MATERIALS AND METHODS

We conducted four types of surveys in early October, 1997 within and adjacent to the proposed disturbance area for the SUFCO mine.

1. Structure searches. We surveyed cliff faces for caves and enterable slots and the riparian zone for hollow trees or trees with smaller cavities which might be inspected without endangerment to the tree, cliff or surveyor. We also surveyed undersides of bridges for day and night roosting bats, guano or insect remains, the latter which indicate use other than survey dates. Our techniques followed those of Perkins and Schommer (1993).
2. Mist nets. We used mist nets (12 total net nights) in two creeks (Link and Muddy) to determine presence of nettable bats, for two consecutive nights and at five ponds on the upper plateau at the head of Box and Link Canyons (Figure 1). In addition, we used mist nets and bat traps to sample shelter caves and a dugout blasting shed near the old Link Canyon coal mine.
3. Bat detectors. We used broad band ANABAT II bat detectors, coupled with recorders and timers sited at three stations within each canyon and three stations adjacent to the upper edge of each canyon (Figure 1). There is some controversy in identification of bat echolocation calls using ANABAT detectors. It results mostly from a lack of knowledge of how plastic and variable calls are within species. In identifying calls we collected here, we used call libraries developed by ourselves and O*Farrell and Gannon. To be assigned a species a call must have at least two full sequences, call duration and minimum frequency had to match calls for that species from our library. Fragmented calls and those with varying minimum frequencies or call duration were not identified as anything other than "bat present". This is an extremely conservative approach to call identification. There remains a small probability that some calls are not correctly assigned, as it is possible that bats can imitate other species calls to some degree, much like starlings imitate other bird species calls.
4. Audible bat transects. We walked transects along the bases of cliff faces and through appropriate meadows in each canyon (Figure 1). We also walked transects along the upper edges of each of the canyons above the ground proposed for subsidence. The main purpose of these transects was to

detect presence of *E. maculatum.* Transects began below cliff faces and extended away and into the riparian zone (Figure 1). Listening stations were established every 200 meters. Five (5) min. were spent at each station listening for *E. maculatum*. Transects were walked two consecutive nights.

We collected the following data for each transect, mist net area and ANABAT station: elevation, slope face, habitat (determined by dominant plants), number of calls heard, time of day, bats captured or observed and morphological characters of bats captured.

RESULTS

1. Structure searches. We noted no bats in any shelter cave or using the old blasting room. We surveyed the bridge where the highway crosses the Muddy Creek and noted a maternity colony of *Myotis lucifugus* (Table 1). We found no hollow trees and noted no climbable trees with obvious woodpecker holes. We noted no suitable habitat, did not record via detectors or capture or note by other indicators the presence of *C. townsendii.* It is our opinion that the bat does not occur in any significant numbers in the three canyons. At the head of Box Canyon and East Box Canyon, there are shelter caves that could provide refugia for male or non-reproductive females of this species. Due to archeological digging it was impossible to determine from guano and insect remains if there was previous bat use. Archeologists noted some bat activity at dusk in July of 1997, when excavation work occurred after dark. From their descriptions we could only surmise they were bats.

2. Mist nets. We captured *M. californicus* and *M. yumanensis* in Link Canyon using mist nets (Table 1, Figure 1). Despite netting for an equivalent of 6 net nights in quiet pools in Muddy Creek, we caught no bats in that canyon with nets.

3. Bat detectors. Calls recorded indicate the presence of *Eptesicus fuscus, E. maculatum, Lasionycteris noctivagans, Myotis californicus, M. ciliolabrum, M. evotis, M. lucifugus, M. yumanensis, Pipistrellus hesperus* and an unidentified *Myotis species* (Table 1).

4. Audible bat transects. Calls of *E. maculatum* were detected in lower Box Canyon and throughout Muddy Creek Canyon at every station but three. At one station at least two bats were simultaneously noted and could be seen and heard. No calls were heard at the upper reaches and breaks of the three canyons or in Link Canyon proper. Visual sightings of at least seven individuals were noted. Calls of *E. maculatum* were also detected in Ferron, at Mill Creek Site State Park and in Huntington.

DISCUSSION

We believe the data and the habitat survey suggest that proposed lease areas within the three canyons and on the upper plateau, do not contain suitable habitat for *C. townsendii,* or significant numbers of individuals. Absent are suitable structures for day roosting and hibernacula.

Cliff habitat below the rims of Muddy Creek Canyon and the lower reaches of Box Canyon appear to provide ample habitat for a rather large number of individual *E. maculatum.* Based on flight patterns we determined by following direction of calls and trying to approximate forage routes, at least five individuals were noted in the Muddy Canyon transects and at least two individuals in the Box Canyon transects. Bats appeared to be flying foraging routes, best described as long and narrow. One route appeared to be at least 500 meters long by 200 m wide. Forage routes appeared to be along the "edges" where meadows met stands of trees or where meadows met riparian zones or cliff bases. We noted no *E. maculatum* calls from transects on the breaks or in Link Canyon. *E. maculatum* appears to prefer to roost in vertical cracks in cliff faces at least 75 m long and 25 m high (Pierson and Rainey 1997). Such cliff faces occur in Link Canyon, but vertical cracks are not numerous. Most weathering as noted above has resulted in shallow caves, likely not suitable habitat for *E. maculatum* or any other species.

Paucity of other bat species in numbers of captures and numbers of calls recorded can be attributed to lack of roost habitat other than vertical cracks in cliff faces and time of sampling. On the upper plateau, we only noted 7 dead and defective trees during transects, and within Link Canyon, the junipers are relatively small in height and diameter. Perkins and Peterson (1996) noted a paucity of bats in a similar habitat in southern Idaho. They attributed the lack of bats to a lack of roosts. In Idaho, only doghair junipers and occasionally an intact riparian zone with dying cottonwoods provided roost opportunities for bats.

We believe that cliff subsidence may have some impact upon local populations of *E. maculatum*. If subsidence occurs in spring and summer, it may cause reproductive females to carry young to another less favorable roost site due to cliff face movement and dilation or restriction of roost cracks. During winter, torpid bats may not have enough time to arouse and escape during subsidence. Subsidence will likely provide new cracking in cliff faces increasing potential roost sites. Without definitive studies it would be extremely difficult to determine long term impact. Common sense tells us that short term impact during subsidence may be negative to a few bats, but impacts are likely offset by the newly formed vertical cracks which may increase roost potential.

REFERENCES

Barss, J. and R. B. Forbes. 1984. A spotted bat (*Euderma maculatum)* from north-central Oregon. Murrelet 65:80.

Bruns, H. 1960. The economic importance of birds in forests. Bird Stud. 7: 1193-208.

Collard, T. S., S. D. Grindal, R. M. Brigham and R. M. R. Barclay. 1991. Identification of the status and critical habitats of the Spotted bat (*Euderma maculatum),* Pallid Bat (*Antrozous pallidus),* and Fringed Bat (*Myotis thysanodes)* in the South Okanagan Valley, British Columbia. Rept. to the World Wildl. Fund, B. C. Min. of Environ. and B. C. Habitat Conserv. Fund. 26 pp.

Constantine, D. G. 1970. Bats in relation to the health, welfare and economy of man. *In* Biology of Bats. Vol. II. W. A. Wimsatt, ed. Academic Press, NY, NY. pp. 320-420.

Hill, J. E. and J. D. Smith. 1984. Bats: a natural history. Univ. Texas Press, Austin TX. 243 pp.

Perkins, J. M. 1992. Are bats normal? Paper presented to the 23rd North Amer. Symp. on bat Research, Gainseville, FL.

Perkins, J. M. 1994. Results of summer bat surveys, Wallowa Valley Ranger District, Eagle Cap Ranger District and the HCNRA of the Wallowa-Whitman National Forest, Wallowa County, Oregon, Summer 1994. Unpub. Rept. to the USFS. 85 pp.

Perkins, J. M. and C. Levesque. 1987. Distribution, status and habitat affinities of Townsend*s big-eared bat (*Plecotus townsendii)* in Oregon. ODF&W Tech. Rept. #86-5-01. 50 pp.

Perkins, J. M. and S. P. Cross. 1988. Differential use of some coniferous forest habitats by hoary and silver-haired bats. Murrelet 69: 21-24.

Perkins, J. M. and R. G. Anderson. 1996. Relationship of bat abundance to snag abundance. Paper presented to the Washington Wildlife Society, Yakima, WA.

Perkins, J. M., R. G. Anderson and J. R. Peterson. 1997. Relationship of diversity in bat maternity colonies to snag abundance. Paper presented to the 27th annual Symp. on bat Research, Tucson, AZ.

Perkins, J. M. and T. Schommer. 1993. Survey protocol and an interim species conservation strategy for *Plecotus townsendii* in the Blue Mountains of Oregon and Washington. Rept. to USFS. 25 pp.

Pierson, E. D. 1988. The status of Townsend*s big-eared bat (*Plecotus townsendii)* in California. Rept. to Ca. Fish & Game. 34 pp.

Pierson, E. and W. Rainey. 1997. Distribution of the Spotted Bat (*Euderma maculatum)* in California. Paper submitted to the J. Mammal.

Ross, A. 1967. Ecological aspects of the food habits of insectivorous bats. West. Found. Vert. Zool. 1: 204-249.

Sarell, M. J., R. P., Bio and K. P. Mcguiness. 1993. Rare bats of the shrub-steppe ecosystem of Eastern Washington. Rept. submitted to WA. Dept. Wildl. 23 pp. + appendices.

Thomas, J. W., ed. 1976. Wildlife habitats in managed forests. USDA Agric. Handb. #553. 512 pp.

Toone, R. 1992. General inventory for bats in the Abajo and La Sal Mountains, Manti-La Sal National Forest, Utah, with emphasis on the spotted bat (*Euderma maculatum*) and the Townsend*s big-eared bat *(Plecotus townsendii)*. Rept. to USDA-USFS and UT Dept. Nat. Resources. 67 pp.

Toone, R. 1993. General inventory for spotted bats (*Euderma maculatum)* on the Wasatch Plateau, Manti-La Sal National Forest, and the Old Woman Plateau and Thousand Lakes Mountain, Fishlake National Forest. Rept to USDA-USFS, and UT Nat. Resources.

Wai-Ping, V. and M. B. Fenton. 1989. Ecology of Spotted bat (*Euderma maculatum)* roosting and foraging behavior. J. Mammal. 70:617-622.